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HUMPBACK WHALES IN GLACIER BAY:

1983 SEASON

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## INTRODUCTION

In 1983 the National Park Service requested that the National Marine Fisheries Service reinitiate a Section 7 consultation for the endangered humpback whale in Glacier Bay, Alaska. Included in the Biological Opinion was the recommendation that the NPS conduct a season-long photographic identification census of humpback whales frequenting Glacier Bay. This report describes the methods and results of the NPS's humpback whale census during the 1983 season.

## METHODS

Humpback whales were censused and photographically documented in Glacier Bay National Park from July 6 to August 29, 1983. Censusing was conducted from a 4.8m aluminum skiff with a 25hp outboard engine or from a 4.5m Boston Whaler with a 50hp outboard. Although a strict transect path was not followed, in a single day it was usually possible to survey the area from Bartlett Cove, through Whidbey Passage, around Drake Island, south past the Marble Islands to Flapjack, and back through Sitakaday Narrows to Bartlett Cove. Frequent contact was maintained with the NPS Visitors Contact Station and I often moved directly to areas where whales had been reported.

Whales were photographed with a 35mm SLR camera equipped with a 70-210mm zoom lens. Tri-X black and white or Ektachrome 200 color film was used.

Whale censusing was based on direct observation and photographic identification of individuals. Identification involved collecting clear photographs of the underside of the tail and dorsal fin of each whale. A whale was positively identified only after the film was processed and the prints or slides were compared to each other.

In order to avoid confusion I have standardized the following terms in this report:

"Sample period" refers to the period from July 6 to August 16 which is used for comparison to the 1982 results. "Summer season" is used to refer to the period from July 6 to August 29 inclusive of the sample period. A whale is referred to as a "resident" only if it remained in the bay for about four weeks. This definition of resident was used to make the data comparable to the previous work of C. Jurasz. A whale is referred to as an "occupant" if it remained in the bay less than four weeks.

## RESULTS AND DISCUSSION

### Abundance

Humpback whale surveys were conducted on a total of 26 days during the sample period and 31 days during the entire summer season. Approximately 248 hours of vessel time were committed to the surveys.

Figure 1 graphs the number of whales observed each day and the cumulative total of individual whales observed during the sample period. The average number of observations across the 26 sample days was 1.7 whales per day (STD=1.03). Of the 45 total whale observations, individual identity was photographically determined in 43 cases (96%). Photographs of one whale observed on July 7 and one on July 8 were of insufficient quality to determine their identity. The photographs were sufficient, however, to conclude that the individuals were probably unique among the whales sighted this season. Thus, from photographic comparisons I estimate that 13 individual whales entered Glacier Bay during the 1983 sample period. Two additional individuals were photographed on August 19, after the end of the sampling period. These two individuals were not subsequently observed.

Individual Identification. Table 1 shows the photographic record of whales in Glacier Bay. Seven whales historically known to visit Glacier Bay returned this year: Chop Suey (KBML #118); Lumpy (KBML #559, Jurasz's 'Fingers'); White Eyes (KBML #117); Wheezy (KBML #157, Jurasz's 'M.D.');

Dike (no KBML #); Garfinkle (KBML #516); and KBML #159 (see Jurasz and Palmer, 1981; Baker and Herman, 1983). An eighth whale, referred to in this report only as 1-20-VII (seen first on July 20), is apparently mislabeled as Chop Suey in a fluke photo in the Park Service's photographic catalogue developed by G. Jurasz and Sea Search. This documentation suggests that this whale may also have visited Glacier Bay in past years.

Of particular interest is the resighting of Dike and Garfinkle in Glacier Bay this year. Garfinkle was first observed in Glacier Bay as a calf in 1974 and has returned every year except 1976 and 1982. In 1982 it was resident near Pt. Adolphus. Dike was observed in Glacier Bay at least as early as 1975. Both Dike and Garfinkle are included by Jurasz and Palmer (1981) among their most thoroughly documented individuals in Glacier Bay. These whales are also the two largest contributors to the blow interval data set used by Dean et al. (1983 draft); together they contributed 16% of the 125 data sets used in Dean's analysis.

Of the total of 15 whales entering Glacier Bay during the summer season of 1983, only six were observed in the bay on more than one day. Table 2 shows the minimum period that each of these six whales occupied the bay. Using Jurasz's criterion of "about four weeks", only Chop Suey can be considered to have been resident in the bay.



Table 2. Minimum period of occupancy of six whales in Glacier Bay.

| Whale      | Days spent in Glacier Bay |
|------------|---------------------------|
| Chop Suey  | 54                        |
| White Eyes | 11                        |
| 1-20-VII   | 16                        |
| Dike       | 15                        |
| Garfunkle  | 12                        |
| KBMML #159 | 19                        |

The abundance of whales during the 1983 sampling period may be compared to that for the 1982 sample period in three ways: a) Total number of entries; b) total number of residents; and c) total number of whale-use days. Whale-use days were calculated by simply adding the minimum period of occupancy of all whales observed during the sample period. Table 3 summarizes these comparisons. It is clear that whales were considerably less abundant in Glacier Bay during 1983 than in 1982. In 1982 20 whales entered the bay, six became residents, and there was a total of 252 whale-use days. In 1983, 13 whales entered the bay, one whale established residency, and there was a total of only 108 whale-use days.

Table 3. The abundance of whales in Glacier Bay: 1982 and 1983.

|                | 1982 | 1983 |
|----------------|------|------|
| Entries        | 20   | 13   |
| Residents      | 6    | 1    |
| Whale-use days | 252  | 108  |

Whale Log Summary. Each north-bound or south-bound leg of the Thunderbay and the Glacier Bay Explorer can be considered a line-transect of the bay. Each leg can provide a daily estimate of abundance for comparisons across a season and between years. Other sighting platforms or information are much less useful for such comparisons because of differences in observer effort and experience.

Figure 10 shows the average number of whales sighted per transect leg for both tour boats during 15-day periods from June 1 to August 30 for the years 1982 and 1983. Because each north-bound and south-bound leg is treated independently for the two vessels, the average sightings for a 15-day period are the result of counts from 60 transect legs. The 1982 data show considerably fewer sightings than 1983 during early June and a much more abrupt increase in sightings during early July. This abrupt increase was almost certainly the result of the group movement of the four residents into Bartlett Cove on about July 7, 1982. The 1983 sightings show a rapid increase in sightings from early June to the peak in early July, followed by a rapid decline in late July and early August. A slight increase in sightings during late August is probably not the result of a real increase in numbers of whales, but reflects a slight improvement from the generally poor weather during early August. The actual number of whales probably held steady from late July to late August.

Although the whale log can provide some general information about the number and location of whales in the bay, I do not believe it can provide an accurate estimate of abundance or even a reliable index of relative abundance. The degree of variability found even in the restricted subset of the log data used in the preceeding analysis is unacceptably high and can provide some misleading results. For example, the average number of whales sighted per tour-boat transect was 0.43 during the summer of 1982 and 0.59 during the summer of 1983. This would suggest that there were somewhat more whales in Glacier Bay in 1983 than in 1982, a conclusion that is clearly contradicted by the photographic data. I suggest that the results of any analysis based on the whale log be viewed with caution.

#### Distribution

Figures 2 and 3 show the initial locations of all whales observed in July and August respectively. In July the sighting locations are fairly scattered but tend to cluster in the Whidbey Passage and lower-bay areas. In August the distribution of sightings changed substantially, with whales tending to cluster in the Beartrack to Leland Island area. The distribution of sightings in 1983 varied ~~considerably~~ <sup>dramatically</sup> from that of 1982. In 1982 four whales were resident in Bartlett Cove and two were resident in Whidbey Passage. Transient whales were also observed most often in these areas. No whales were observed in the Beartrack to Leland Island area.

Figures 4 through 9 show the sighting locations of different individuals across the entire sampling period. Chop Suey (Figure 4) was most commonly seen from Rush Point to Berg Bay in July and from Beartrack to Leland Island in August. In 1982 Chop Suey was resident in Bartlett Cove and was observed outside the cove only once during our six-week study period. White Eyes (Figure 5) was seen twice near Berg Bay, where it was most frequently seen in 1982. Garfunkle (Figure 6) was seen near Leland, South Marble, and Sturgess Islands, an area it has historically frequented (Jurasz and Palmer, 1981; Baker and Herman, 1982). Dike, KBMML #159, and 1-20-VII (Figures 7, 8, and 9) were not reliably found in any single area, but tended to range widely across the mid-bay.

## SUMMARY

1) A total of 13 individual whales were photographically documented to have entered Glacier Bay between July 6 and August 16 of 1983. Two additional individuals entered the bay on August 19, after the sampling period ended.

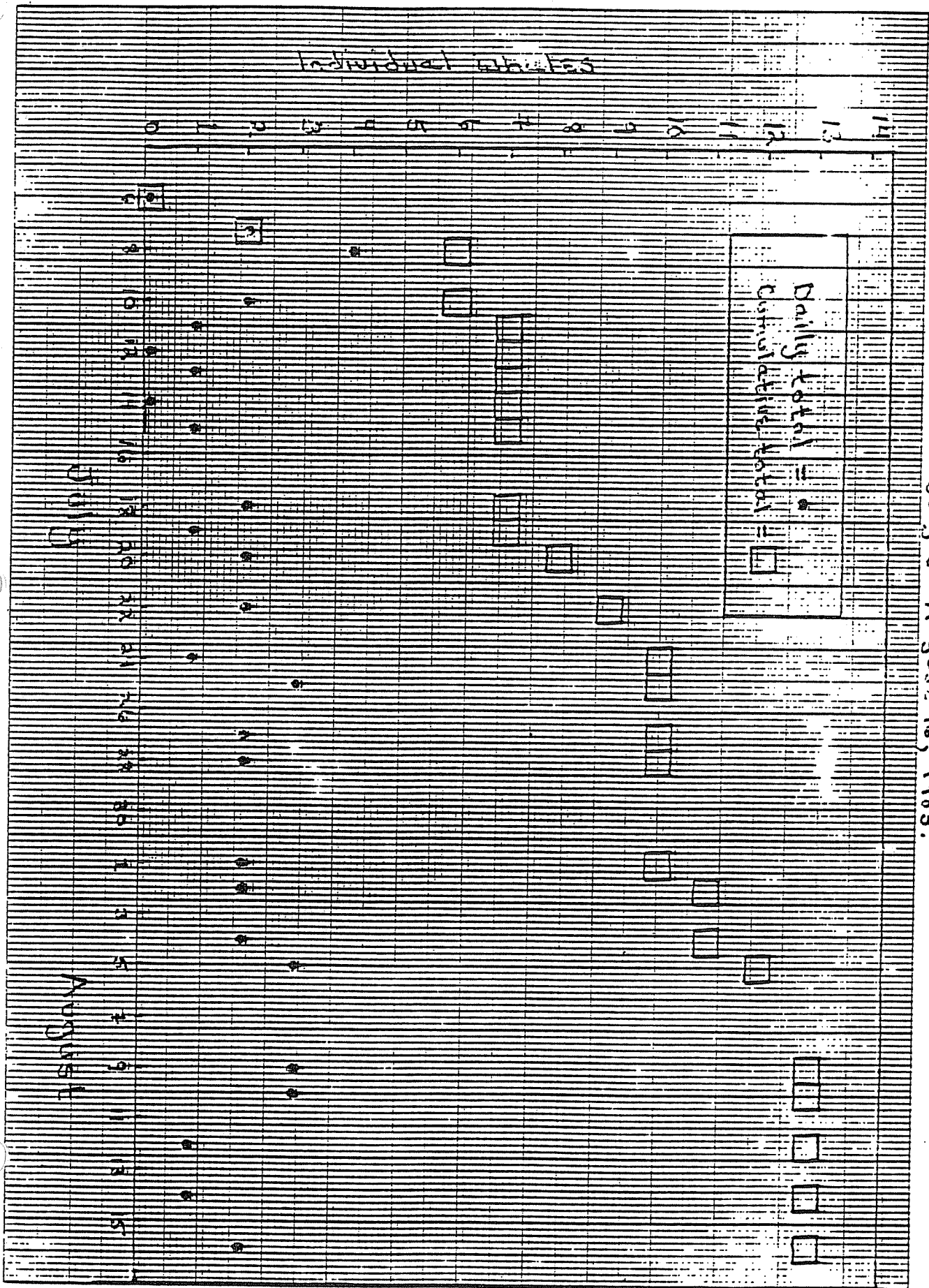
2) A single individual, Chop Suey (KBMML #118), was resident in the bay for a period of at least 54 days during the summer season. Five other individuals each occupied the bay for periods of about two weeks during the summer season.

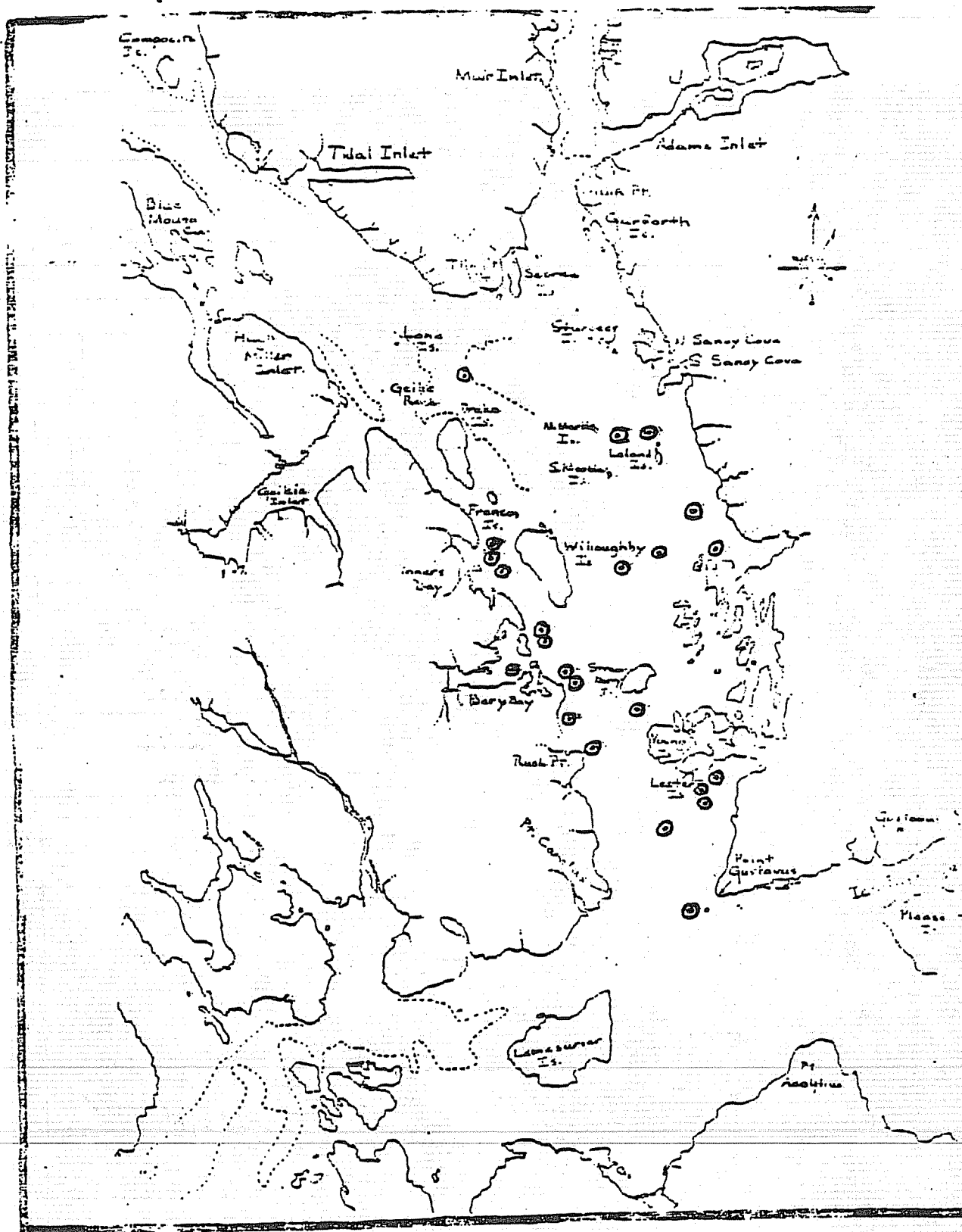
3) Sighting records of the Thunderbay and the Glacier Bay Explorer were extremely variable but provided some general information about changes in the numbers of whales in the bay.

4) Whales were found most frequently in the Rush Point to Fingers Bay area in July and in the Flapjack Island to Leland Island area in August.

5) Some individual whales were reliably found in certain areas of the bay, but ~~overall~~ whales did not constrain themselves to the narrow range of movement observed in 1982.

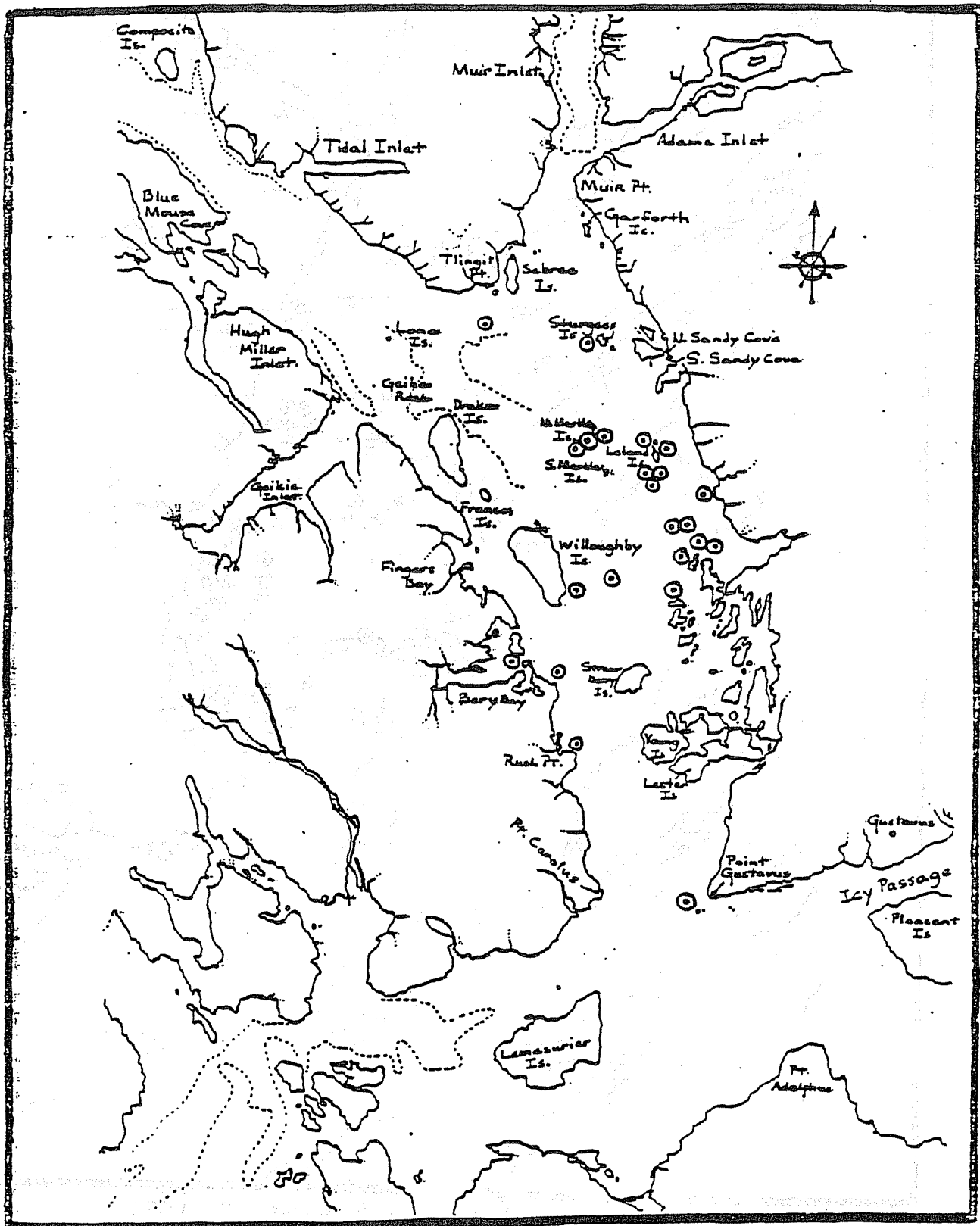
Figure 1. Daily and cumulative total of individually identified whales for the period July 6 - August 16, 1983.





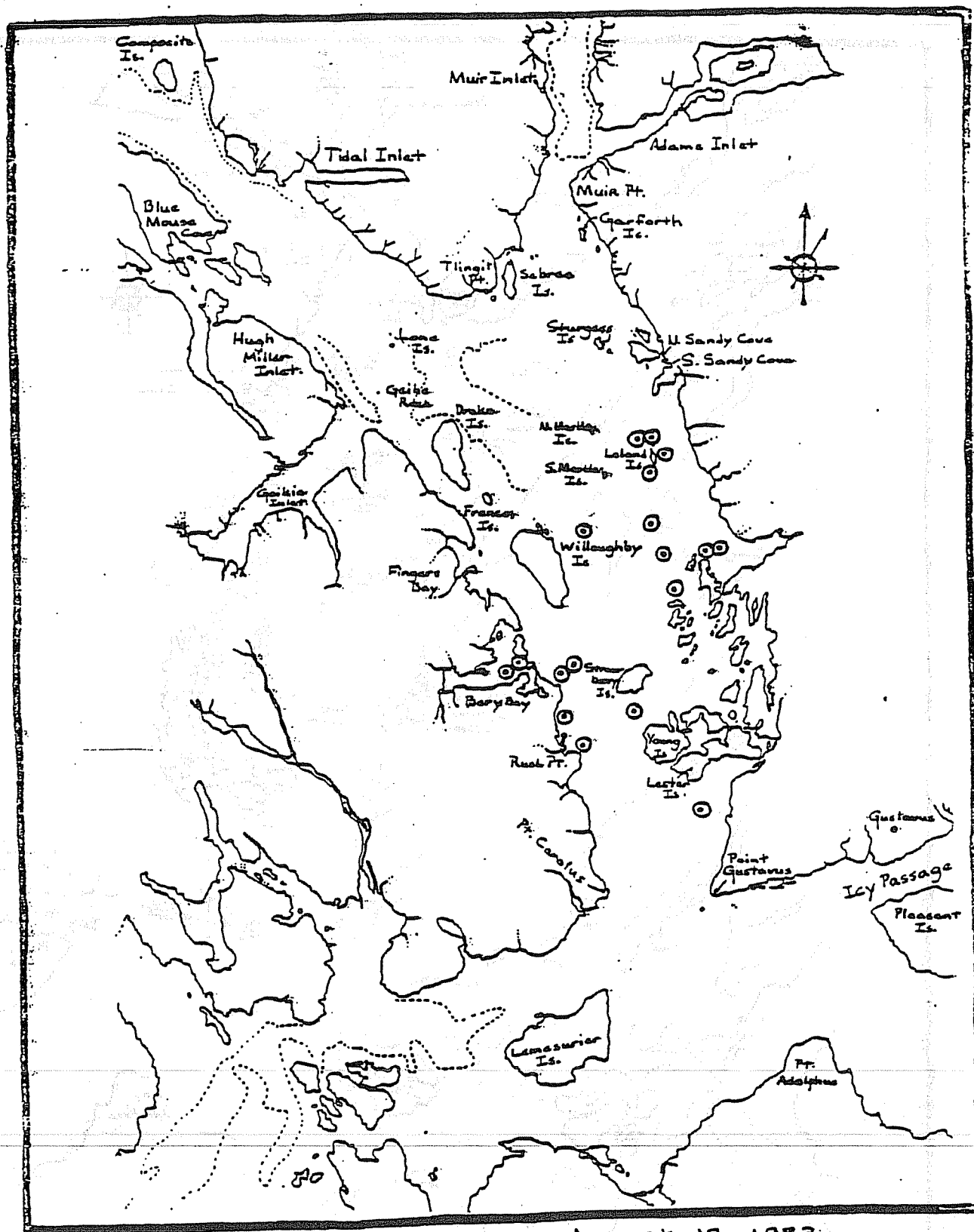
Wh. lvs sighted in Glacier Bay July 7 - July 29, 1983

Figure. 2.



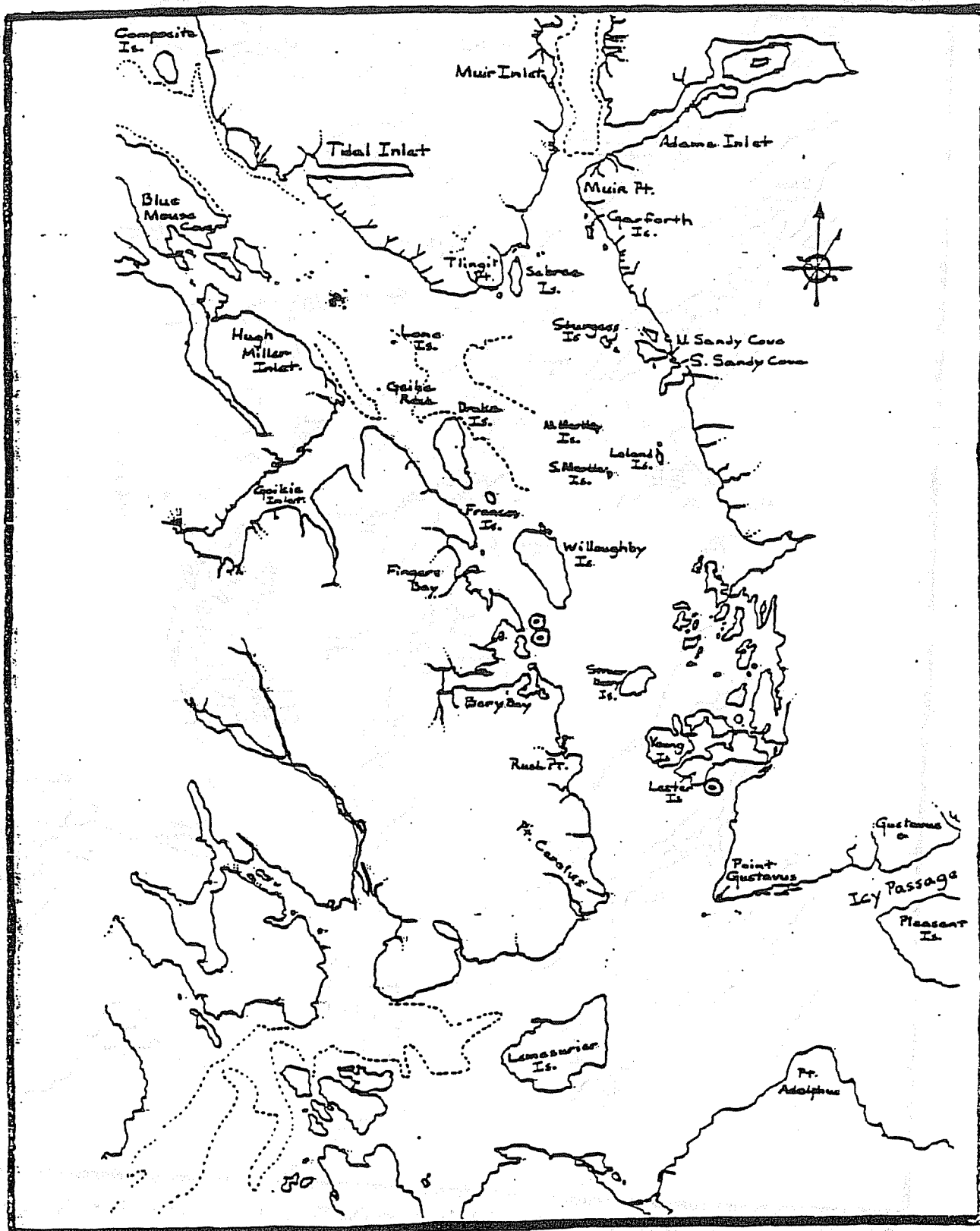
Humpback whales sighted in Glacier Bay August 1 - August 19, 19

Figure 3.



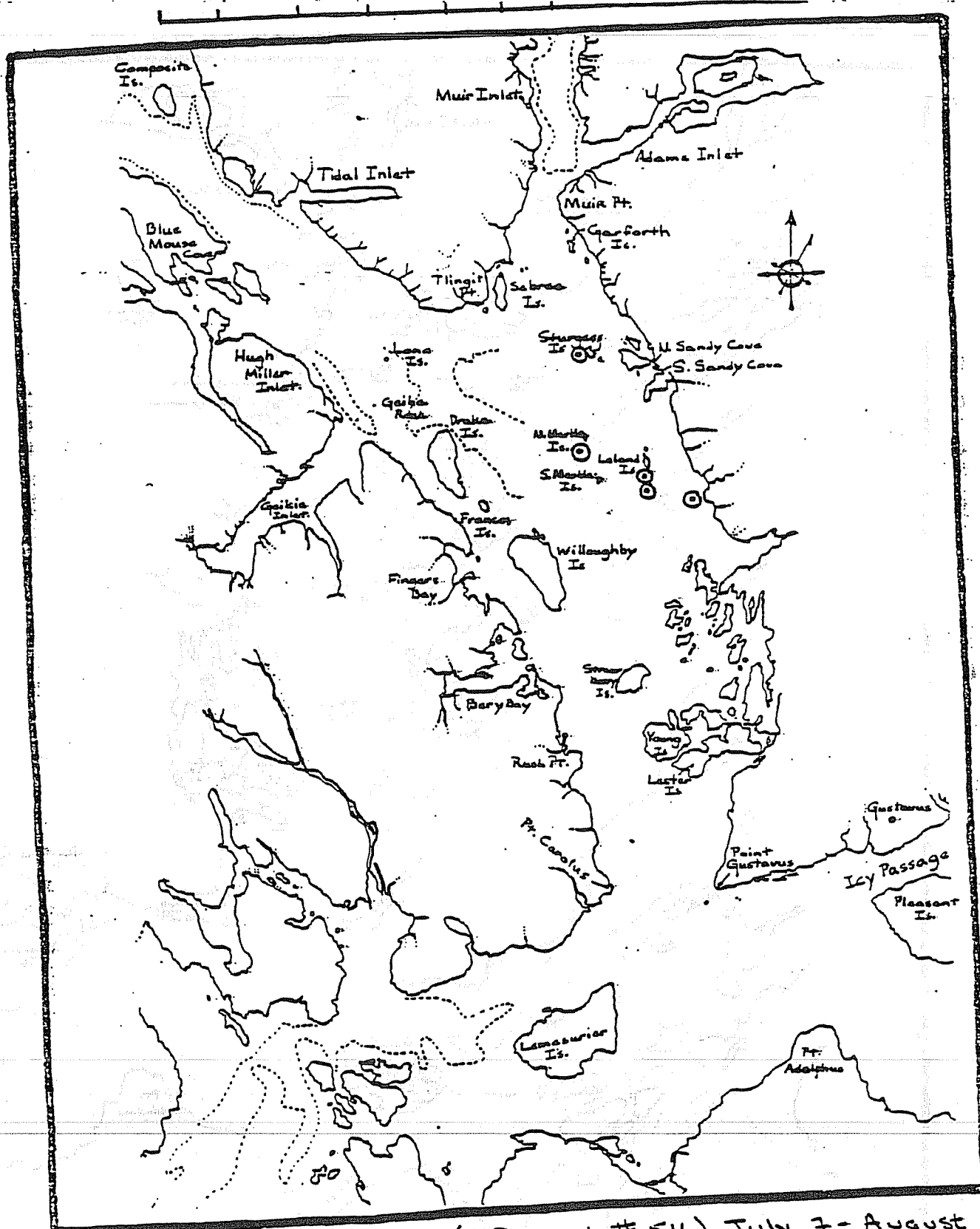
Sightings of chop guey July 7 - August 19, 1983  
(KBmmL #118)

Figure 4.



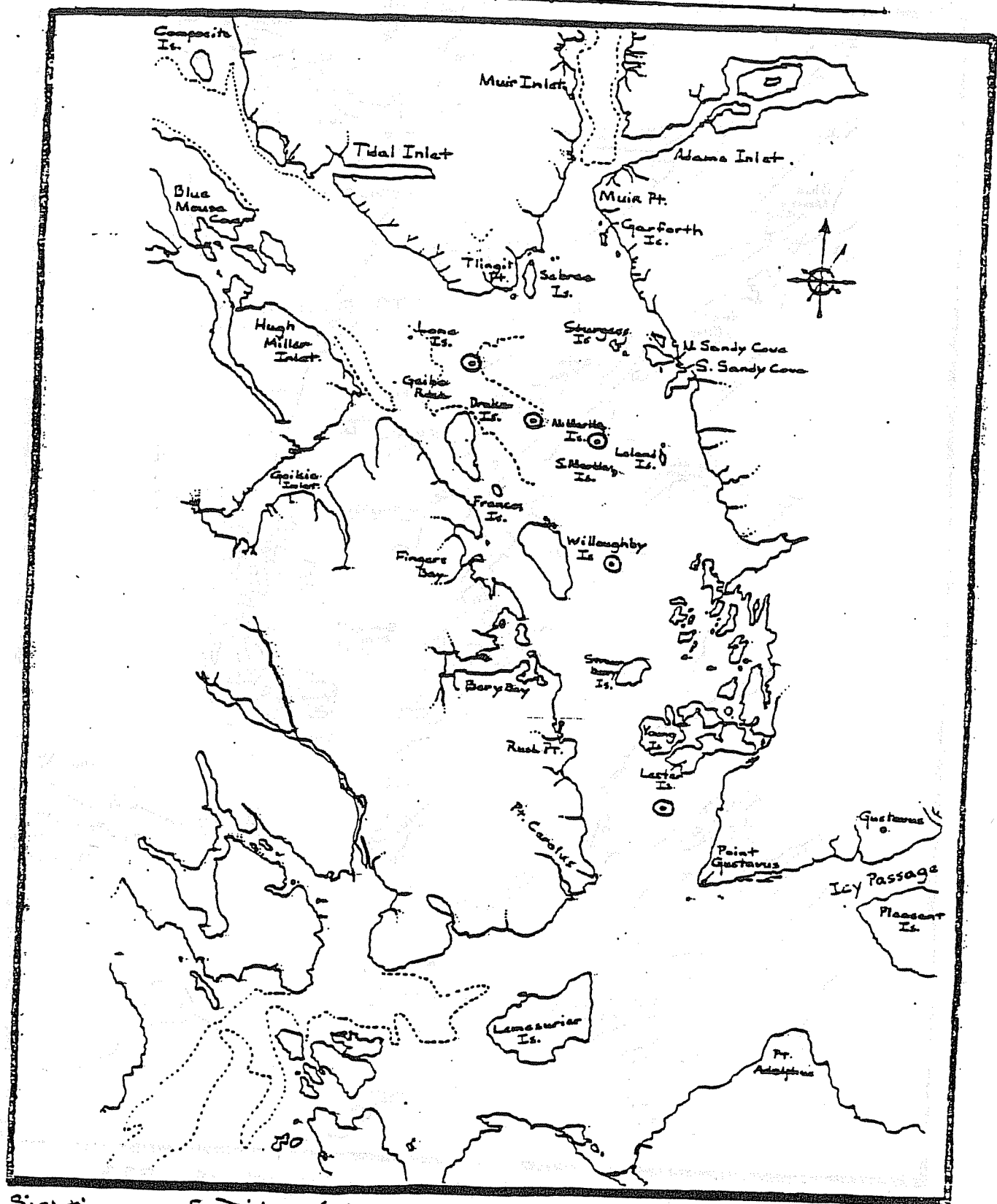
Sightings of White Eyes (KBmml # 117) July 7 - August 19, 1983

Figure 5.



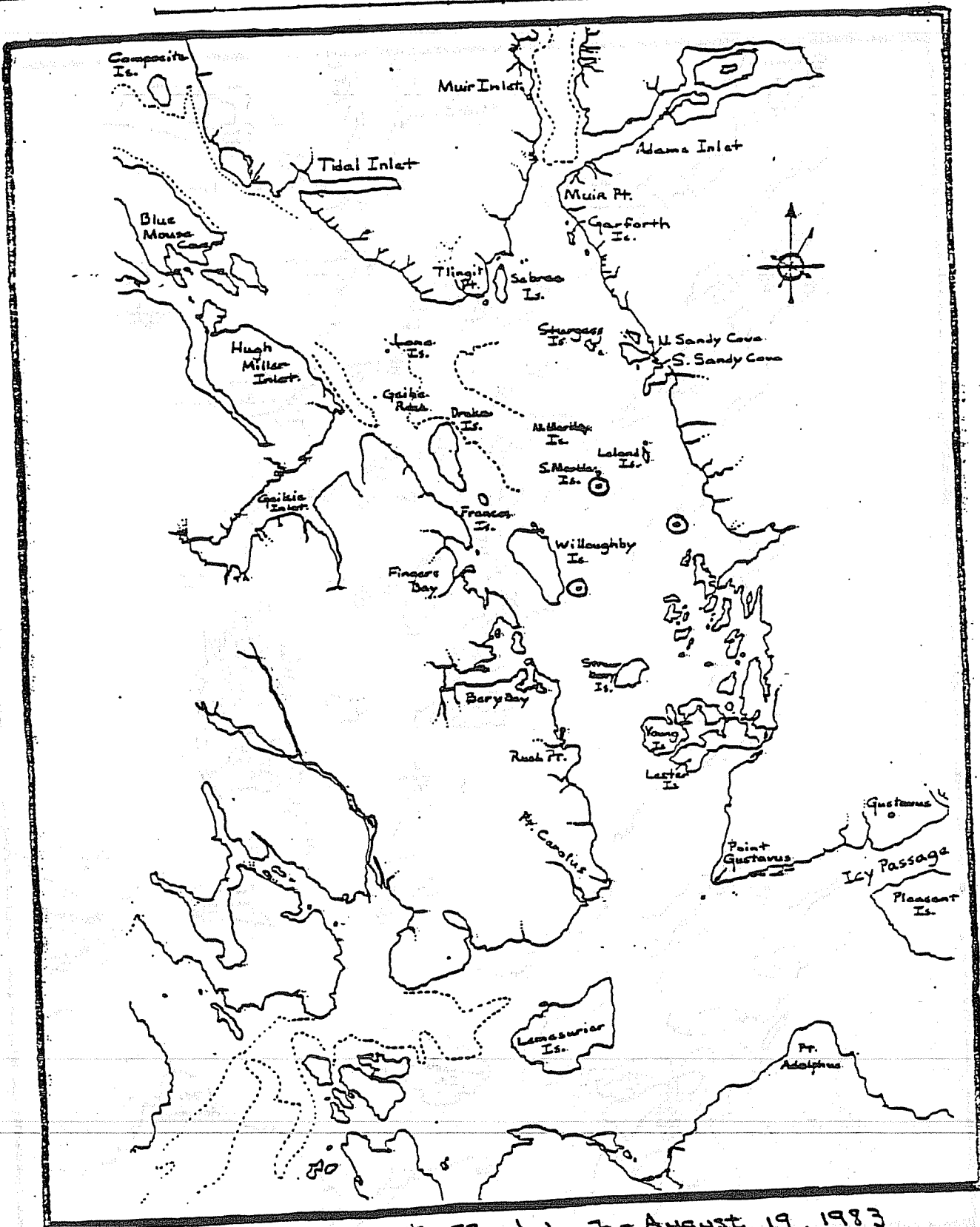
Sightings of Garfunkle (KBMM L# 516) July 7 - August 19, 1983

Figure 6



Sightings of Diels (KBMML# ) July 7 - August 19, 1983

Figure 7.



Sightings of KBMML #159 July 7 - August 19, 1983

Figure 8.



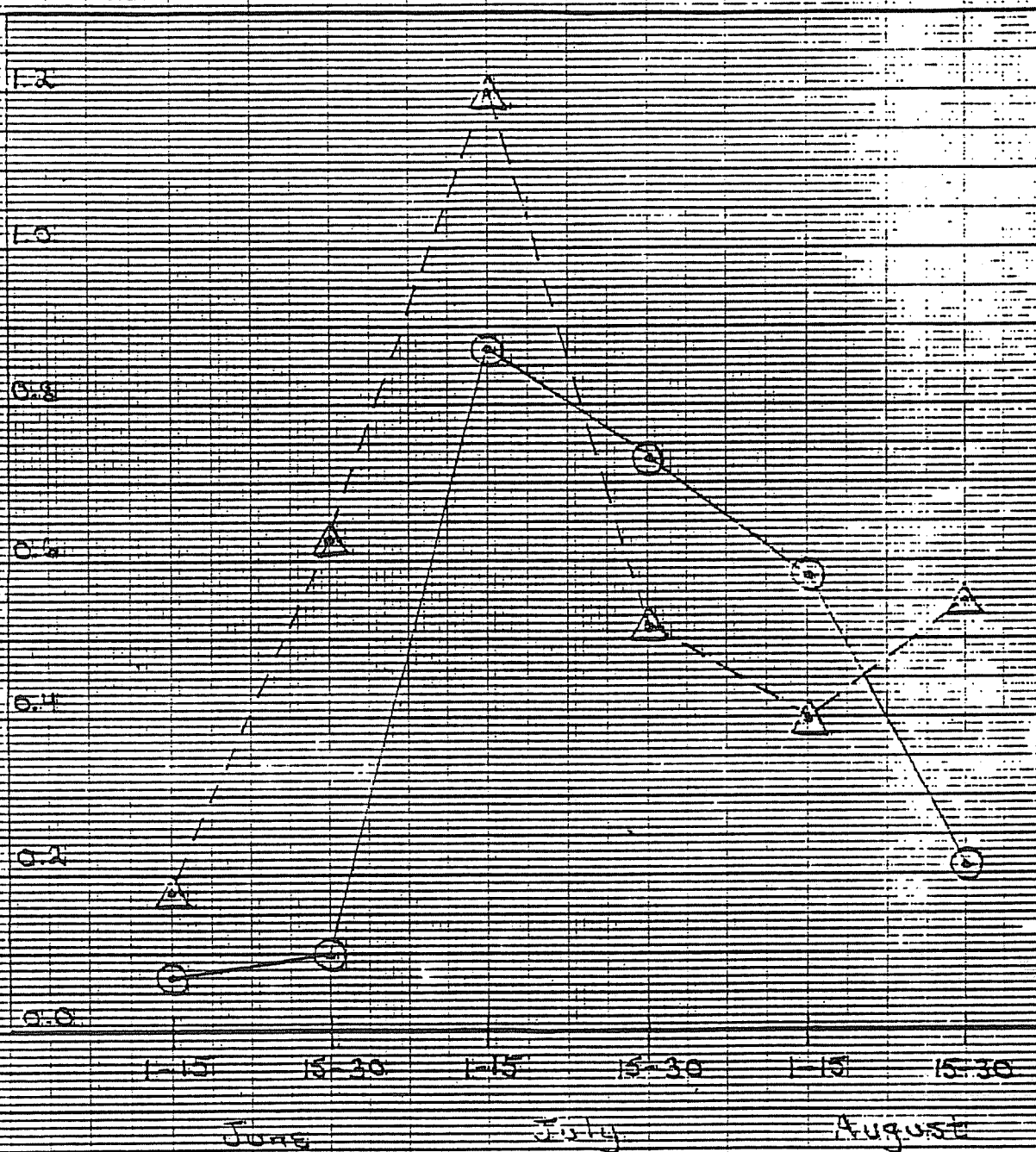


Figure 10. The average transect-log whale sightings from the Thunderbay and Glacier Bay Explorer during 1982 and 1983.

## APPENDIX A

### RECOMMENDATIONS CONCERNING METHODS OF HUMPBACK WHALE CENSUSING

#### Methods

An effective censusing program must be designed to address the following questions: a) How many individual whales enter the bay during a season; b) how long does each individual remain; c) what is the general distribution pattern of whales; d) in which areas does each individual spend its time; and e) how do the results of a given season compare to other seasons? The question of comparability of results across years is particularly important. Conversations with NMFS personnel have clarified the intent of the Biological Opinion; any comparisons to the number of whales entering Glacier Bay in 1982 should be made from data collected during a period of time and with a level of effort comparable to those used in 1982. By beginning to standardize censusing methods the NPS can assure the comparability of future data.

Standardization should be considered in four aspects of censusing methods:

a) Sample period; b) level of effort; c) transect design; and d) photographic technique.

Sample Period. The sampling period in 1982 began on July 9 and ended on August 15. I consider this period to be the minimum necessary for censusing and recommend that future censusing begin on June 1 and end on August 31. Although data collected outside the dates of the 1982 sampling period may not be immediately useful for comparison to 1982 entry levels, the additional data will provide a better baseline for future management decisions concerned with population fluctuations.

Level of Effort. Three to four days a week were committed to some photographic effort in Glacier Bay during 1982. This level of effort increased to about four days a week in 1983. I feel that the 1983 level of about four days is appropriate. If the overall sample period is increased to include the entire summer, a three-days-per-week commitment would be sufficient. This would leave the whale biologist time for other resource management tasks.

Transect Design → I do not believe that a strict transect is appropriate for Glacier Bay. Strict transects are most useful when the distribution of organisms is unknown or random. Whales in Glacier Bay are generally clumped in distribution and tend to be located in predictable areas. A strict transect would cover a lot of empty miles. No true transect design was used in 1982. In 1983 a loosely defined transect was followed about two days a week. On other days I generally consulted the whale log for recent sightings and moved to those areas. I recommend that future censusing complete a loose transect one or two days a week. This transect should run from Bartlett Cove to about 1km offshore of Rush Point, north through Whidbey Passage to Geikie Rock, east between Sturgess and North Marble Islands, south between the Marbles and Leland Island to Flapjack, West to the south tip of Willoughby, then south along the east side of Sitakaday Narrows. This route covers a total of approximately 90km and can be completed in a single day if the weather is good and

one or  
not too many whales are encountered. If two days a week are taken for transecting, the remaining time can be spent photographing in areas of known concentrations.

Photographic Techniques. Photographic techniques and the ability to approach whales without disturbance is probably the most difficult aspect of a censusing program to standardize. A degree of standardization can be achieved only by some continuity or overlap in personnel. In order to collect photographs of ID quality in a high percentage of encounters, personnel involved must have a strong interest and a fair degree of experience with whales. Without consistent ID quality photographs, estimates of abundance will not be accurate.

Camera equipment necessary for photographic documentation includes: a) An automatic SLR 35mm camera with manual override, shutter speed priority, and aperture priority options; b) a high-quality 70-210mm zoom lens and a 300mm telephoto lens; c) a motor-drive; and d) a hard-shell, waterproof case for protecting the equipment. I recommend Tri-X 400 ASA black and white film to allow for high shutter speeds (1/500sec minimum) with the long lens and under overcast conditions.

## APPENDIX B

### RECOMMENDED STEPS FOR WHALE MANAGEMENT

#### Coordination Between Whale Research and the Whale Ranger

In 1984 whale research and censusing will again be conducted under contract by the University of Hawaii. At present, there is no formal system of coordination between the whale ranger and whale biologists. Although informal communication has generally been adequate this year, increased coordination could improve the effectiveness of both the ranger's and the biologist's tasks in the future. Larry Bright, Whale Ranger, has made several recommendations concerning improved coordination in a memorandum dated September 2, 1983. I am in general agreement with his four suggestions. I would also propose the following:

- a) The whale ranger should be provided with a 35mm SLR camera equipped with a 70-210mm zoom or 300mm telephoto lens. The camera and film could be provided by the resource management specialist. The use of a camera would allow the ranger to take ID's on an opportunistic basis and would provide the potential for better documentation of vessel/whale interactions. The ranger could be instructed by the whale biologist in the use of the camera and documentation of the film.
- b) The whale biologists should be provided with a log for recording vessel activity that appears to be in violation of Park Service regulations. This log would then be available for review by the whale ranger at any time and would be submitted to the rangers at the end of the season. An important aspect of this last suggestion is that the whale ranger follow-up on the reports and communicate any actions taken to the biologist. This type of feedback is important for inter-personnel rapport.

These two suggestions are intended to help formalize and coordinate areas of overlap in the activities of the whale ranger and whale biologist. They are not intended to imply that I think the tasks of a whale biologist and a whale ranger can be accomplished by a single employee. I believe that the present separation of research and regulatory enforcement is healthy.

#### Implementation of Temporary Whale Waters

There are several problems with the present system for implementing temporary whale waters that should be addressed. First, whales should receive the additional protection offered by temporary whale waters as soon as they enter an area. Many animals are most sensitive to disturbance during the early stages of establishing an area of residency. After an animal establishes residency, it often becomes somewhat "hardened" to disturbance. This may simply be the outcome of a kind of investment economics on the part of an animal; after a certain amount of time and energy has been invested in an area, the animal is more reluctant to leave.

Second, the policy of establishing temporary whale waters is based on observations that whales establish "residency" in geographically defined areas. Unfortunately whales do not establish these well-defined "home-ranges" every year. For example, in 1982 several whales established a well-defined area of residency in Bartlett Cove. In 1983, whales were reliably found in some areas of the bay but

did not remain in constrained areas comparable to those used in 1982. The pattern of whale distribution in 1983 made it difficult to implement temporary whale waters but it did not alleviate the need for extended protection in the mid-bay area.

I would propose that permanent whale waters be extended to include:

a) Whidbey Passage to the northern tip of Drake Island and; b) the area to the east of a line drawn from the western shore of Strawberry Island to North Marble and then to Sturgess Island. These extensions would encompass all of the areas frequented by whales in the past two seasons, and the majority of the areas historically used. Mid-channel waters would then be designated temporary whale waters only if a substantial amount of mid-channel feeding was observed; a situation that has not occurred in the last two years. Designating these two areas as permanent whale waters would avoid accusations of capricious regulations and considerably ease the enforcement process. The problem of attracting vessels to an area recently designated as temporary whale waters would also be eliminated. Most importantly, whales would not first have to demonstrate "residency" in order to qualify for the extended protection they might need to establish residency.

#### Tour Boat Operations

For the past few years, the primary tour boats operating in Glacier Bay have been the Thunderbay and the Glacier Bay Explorer. Both of these vessels operate out of Bartlett Cove and carry Park Service naturalists on all of their trips in the bay. In 1982 and 1983 the Majestic Alaska Explorer began operating in the bay. This vessel originates outside of Glacier Bay and visits the bay only once a week. No Park Service naturalists are stationed aboard this vessel. It seems likely that Glacier Bay will see an increase in the number of tour boats like the M.A.E. My observations of the M.A.E. this year indicate some areas of concern in this type of operation. On the positive side, the M.A.E. originates outside of Bartlett Cove. This eliminates the potential for disturbing whales in the Bartlett Cove area. However, if the M.A.E. comes into the cove to drop off or pick up passengers, or continues to pull into the cove to drop off the captain of the Glacier Bay Seal, it simply adds to the potential for impact in the cove.

The operators of the M.A.E. this year did not show much concern for impact on whales in the bay. One of the most serious problems was the use of large-scale float plane transfers. This essentially turns a part of the bay into a marine airport. For example, on August 5 I was observing a single whale traveling slowly west from an area south of Leland Island. The whale had been moving at a steady course and speed for about 35 minutes. At 1742 the M.A.E. stopped in mid-channel about three miles due west and in line of the course the whale was pursuing. Three float planes then landed, transferred passengers and then departed. During this time the whale turned abruptly north, traveling a distance of about 0.5 miles, and only resumes its westerly movement after the M.A.E. departed. Although this was not a very dramatic response, it appeared to be a clear case of avoidance, even though the vessel was over three miles away. Another incident involving the M.A.E. suggested that the vessel's captain was either ignorant or unconcerned about the

In my observations during the past two seasons, these two vessels have shown a high level of adherence to park regulations as well as cooperation with whale researchers and park biologists.

situation regarding whales in the bay. On the afternoon of August 26 I observed Chop Suey feeding in the Beardslee Entrance near the northern entrance to Secret Bay. I contacted the M.A.E. at 1700 when they were near South Marble Island. In response to my questions the captain said they planned to move into Beardslee Entrance and transfer passengers to float planes. I informed them of the location of the feeding whale and suggested that they not transfer in its proximity. The captain thanked me for the information and indicated that they would avoid the area. At 1820 the M.A.E. moved into the area where I had described that the whale was feeding, stopped, and at least one float plane landed and departed. This incident points out a potentially serious problem with tour boats originating outside of the bay, and operating in the bay infrequently and without Park Service naturalists aboard. These vessels may be less sensitive to informal requests concerning their activities in the bay. Certainly the past actions of the Glacier Bay Seal support the seriousness of this problem.

There is a need for more communication between the operators of tour vessels such as the Majestic Alaska Explorer and Park Service management in order to address some of the problems I have outlined. The presence of a Park Service naturalist on board these vessels would also increase the operators' awareness of resource problems and the need for their adherence to Park Service guidelines.

#### Operations of Vessels in Areas Adjacent to Glacier Bay National Park

During the last two summers I have observed a significant number of incidents involving the purposeful or inadvertent harassment of whales in areas adjacent to Glacier Bay National Park, particularly near Point Adolphus in Icy Strait. My impression is that many vessels realize it is illegal to approach whales within the park but consider whales outside the park to be "fair game". It is my understanding that a single ~~National Marine Fisheries Service~~ agent, based out of Sitka, is responsible for the enforcement of marine mammal regulations in Southeast Alaska. This amounts to no enforcement at all. Although the waters near Point Adolphus are not under the jurisdiction of the park, the park shares some responsibility for the number of vessels which frequent this area. I feel that the NPS should strongly encourage the NMFS to increase its enforcement and public education effort concerning whales in Southeast Alaska. I believe an increased effort on the part of the NMFS would also ease the problem of enforcement in the bay.

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